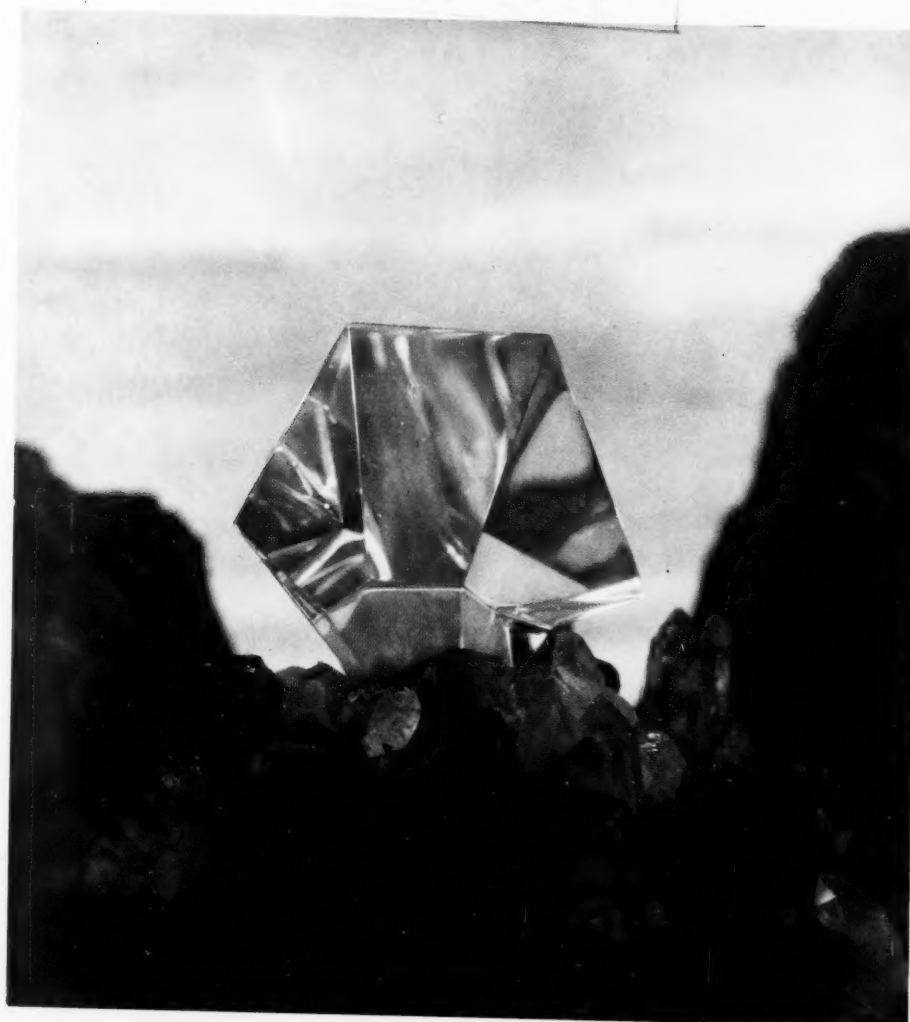


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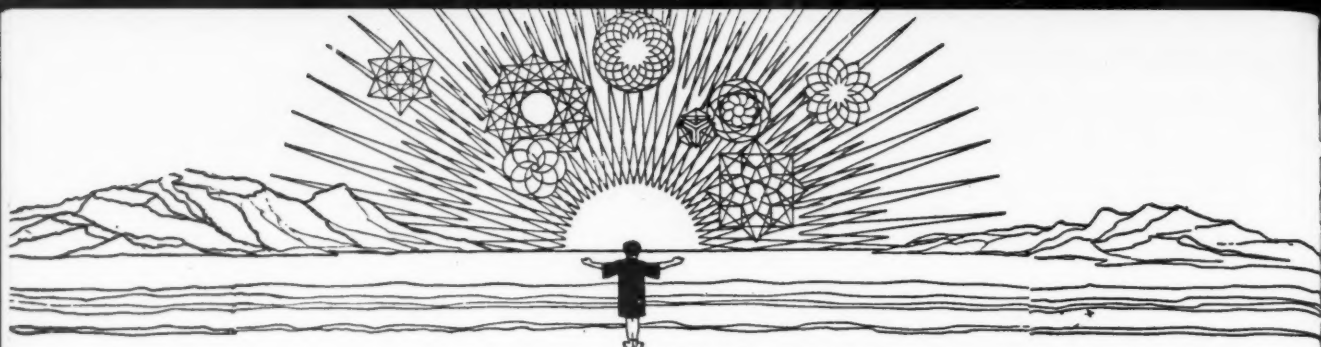
MAIN CURRENTS

IN MODERN THOUGHT



MARCH, 1960

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MAIN CURRENTS

IN MODERN THOUGHT

A cooperative journal to promote the free association of those working toward the integration of all knowledge through the study of the whole of things, Nature, Man, and Society, assuming the universe to be one, dependable, intelligible, harmonious.

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On the cover: The crystal shown illustrates the "pure" antihistamine action of Disomer, a new histamine antagonist. Courtesy of the White Laboratories, Inc.

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assume that the principles of art, the universals of philosophy,
the laws of Nature and Man as formulated by science,
and the truths of comparative religion, can be orchestrated
into a harmonic, meaningful, ethical body of teachings
which can and should be made the central core of curricular
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MARCH, 1960

VOL. 16, NO.

THREE BASIC TRENDS OF OUR TIMES

Pitirim A. Sorokin

The Factors Which Are Creating a New World Culture

PART II

The Integral Theory of Human Personality

THE struggle between the old Sensate and the New, Integral culture or system of values can also be perceived in various theories of human personality and of the human mind.

Sensate theories viewed man mainly as an animal organism of the *homo sapiens* species. They tended to interpret his nature and behavior predominantly in mechanistic, materialistic, reflexological and other "physicalistic" terms. Some of these theories have denied the reality of the human mind; others have recognized only two forms of mental energy: unconscious and conscious. Decadent Sensate theories, as exemplified by Freud, largely reduced mind or human psyche to the pan-sexual unconscious libido or id, filled with Oedipus, sadistic Tetanus and other complexes, with epiphenomenal ego and superego representing a modification of the same unconscious under the pressure of the family and society's censorship. This sort of theory of personality, wherein human nature is degraded to its lowest level, represents the nadir of Sensate conceptions of man.

Fortunately, increased knowledge of human personality has led to an essential repudiation of these decadent Sensate theories as scientifically unsound, aesthetically sterile, and ethically demoralizing. Reaction against them has led to the emergence of a new conception of man as an integral being. This view sees man not only as an animal organism but also as a rational thinker and doer and, further, as a supersensory and superrational being, an active and important participant in the creative processes of the cosmos. In addition to the unconscious and conscious aspects of his nature, he shows himself to be a supraconscious creator, capable of controlling and transcending his unconscious and conscious energies in his moments of "divine inspiration," in the periods of his highest and most intense creativity. As mentioned previously, man's greatest discoveries and achievements have been largely due to his ability to focus supraconscious creativity, assisted by his powers of rational thought and of empirical observation and experiment. If man were an organism motivated and guided only by the libidinal and other forms

of the unconscious, he would have had little more chance to become a creative agent in the universe than the other biological species which are also endowed with the reflexological-instinctive unconscious and with the rudiments of the conscious mind. The fact that *homo sapiens* has a developed rational mind overshadowed by the superconscious has permitted him to exercise an astonishing, ever-growing creativity. The new, Integral theory of human personality recognizes the validity of each of these three aspects of man. It is, in fact, a more precise formulation of the triadic conceptions prevalent in the great religions, which view man as having these three forms of being: 1) the unconscious (reflexo-instinctive mechanism of body); 2) the conscious (rational mind); and 3) the supraconscious creator (Nous, Pneuma, Spirit, Soul, Divine Self). It is in the rational and the superconscious levels of man that the answers may be found to the ancient question: "What is man, that thou shouldst magnify him?"

The Struggle for Existence vs Creative, Unselfish Love

AS a further example of the struggle between the decaying Sensate and the emerging Integral orders, we can take the problem of the main factors of biological evolution of the species, of human behavior, and of the mental, moral and social progress of mankind. The biological, psychological and sociological theories of the nineteenth and early twentieth centuries viewed the competitive struggle for existence as the main factor of evolution and of human progress. Economics and other social disciplines have been based upon the postulate of the *egotistic* man, motivated entirely by his selfish interests and relentlessly pursuing these objectives.

These Sensate beliefs have been unblushingly implemented. They have resulted in the genocidal wars of this century, with their mass murders of non-combatants, including children, in the wholesale destruction of cities and populated regions, and in the armament race and preparation for the next—nuclear and bacteriological—war. In these and similar ways, advocates of these Sensate theories, especially the governments of the mighty

nations, have declared themselves free from the restraints of international law and from the moral precepts of the great religions and ethical systems. In brief, during the last few decades degenerate Sensate theories and practices have led mankind to the extreme of ideological and practical demoralization—publicly approved and supported by a large portion both of the Western and the Soviet blocs of nations.

Fortunately for all of us, during the same period which has witnessed the disintegration of Sensate cultural theory, new and quite different theories and practices have been emerging and gaining strength. These have convincingly shown that mutual aid, cooperation and love have been at least as important as the struggle for existence in biological evolution, and of incomparably greater effect in human progress. These new theories have shown that in his sound and creative behavior man is motivated by sympathy, benevolence and unselfish love rather than by egotism, hate and cruelty. What is more, the energy of this love is indispensable for the generation, continuity and growth of living forms, for the survival and multiplication of the species, and particularly for the health of infants and their growth into mentally and morally sound citizens. Recent studies have also disclosed that love is a powerful antidote against criminal, morbid and suicidal tendencies and against hate, fear and psychoneuroses; that it performs important cognitive and aesthetic functions and is the most effective educational force for the enlightenment of humanity; that it is the heart of a true freedom; that it can remove inter-individual and intergroup conflicts, and transform inimical relationships into friendship. It is even true that altruistic persons live longer than those who are egotistic. Finally, some minimum of unselfish love is absolutely necessary for the durable existence of any society. At the present catastrophic moment of human history, an increase of altruism in individuals and groups and a universal extension of unselfish love are essential if new wars are to be prevented, and mankind freed from its gravest ills.

If space permitted, it could also be shown that a similar drastic revision has occurred in many other basic theories of psychosocial science—in the problems of methods of social research, of causality, of sociocultural structure and dynamics, of the total character of explanation and interpretation of politics and economics, ethics and law, fine arts and other cultural values.

The Struggle in Philosophy

IN the field of philosophy this process has manifested itself, on the one hand, in a considerable diffusion of materialism, mechanism and related Sensate philosophies, explicitly fostered by Communist and Marxist government, and, on the other

hand, in the complete failure of all these officially supported efforts to create a modern and scientific system of such philosophies. No significant new variation of mechanism has been created; no new Democritus, Leucippus or Marx of dialectical or other forms of materialism has emerged. Instead, a legion of popularizers has reiterated, in primitive and naive form, variations of the great materialistic philosophies of the past. If a few of today's materialist thinkers have produced more refined interpretations of various phenomena—cosmic, biological and sociocultural—they have done so by means of an essential deviation from the orthodox principles of materialism in favor of either Hegelian dialectics or some monistic philosophy. This decline in creativity, in spite of widespread sanction and support, is evidence of the aridity and decay in materialistic thought.

A similar sterility has marked other Sensate philosophies, such as empiricism, positivism, utilitarianism, relativism, physicalism, and pragmatism. The modern variations of these philosophical systems are but the poor relatives of great systems of the past. Though quantitatively these systems may seem to be still dominant in modern philosophy, their influence is rapidly fading.

In contrast, much greater creativity and vigor is shown in such emergent systems of philosophy as the Phenomenological, the Existential, the Intuitive, the Neo-Mystic, the Neo-Thomist, the Neo-Vedantist, the Neo-Taoist, the Neo-Realist, the Neo-Hegelian, and others. Although these systems differ in many ways, they are alike in that they all deny materialism and are more congenial to Integral concepts of total reality, of cognition, of human personality, and so on. If these movements cannot be regarded as fully developed systems of Integral philosophy, they are its precursors and contributors, and indicate that in the course of time a full-blooded system of Integral philosophy in all its important variations will be produced.

The Struggle in Religion

IN religion, the discussed Sensate and Integral trends have shown themselves simultaneously:

1. In militant atheism and religious persecutions and, in contrast, in a modest religious revival;
2. In the increased abuse and misuse of Christianity and other great religions by ruling groups, vested interests, and ignorant fanatics, balanced by the purification and ennoblement of traditional religions by those believers who do not distort their great messages and who practice what they preach, particularly as regards the ethical precepts of their faiths;
3. In the emergence of hate-laden, ignorant, pseudo-religious sects on the one hand, and, on the other, of new, intensely spiritual, profound and altruistic religious movements.

The Struggle in Ethics

IN ethics, the continued decay of Sensate order has manifested itself, first, in the progressive repudiation of ethical values as universal norms. A utilitarian and hedonistic view of ethics declares all such values and precepts to be mere human conventions which can be modified and even discarded if they are found inconvenient or painful. Second, these values and norms have been degraded to the level of mere "rationalizations" and "derivations." They are described as "beautiful screens" veiling the egotistic interests of individuals and groups, invented by a clever minority for exploitation of a stupid majority. So treated, ethical values and legal norms have become mere rouge and powder to deck out an unattractive body of Marxian "economic interests," Pareto's "residues," Freudian "Libido," and other complexes, drives and "prepotent reflexes." Third, as a result of this extreme atomization, ethical values have lost their prestige and effectiveness as governors of human conduct. "Thou shalt not" and "Thou shalt" have progressively lost their power, and like the Gospel's "salt that lost its savor" they have become "good for nothing, but to be cast out, and to be trodden under foot of man." Fourth, since ethics has lost its efficacy, rude force remains as the controlling power in human relationships. If neither religious nor ethical nor juridical values control our conduct, nothing is left but force and fraud. The result is to be seen in contemporary moral cynicism and nihilism. Fifth, this state of moral anarchy has naturally engendered the widespread explosion of wars, revolutions and merciless conflicts that has characterized this century. The degradation of moral values has also produced the bestiality and inhumanity shown not only in these wars but in "peacetime" criminality and delinquency. Finally, this anarchy has brought mankind to the brink of Apocalyptic self-destruction as new wars threaten the survival of mankind.

These are the main manifestations of a decaying Sensate moral order.

Fortunately for man, this deadly trend is paralleled and increasingly opposed, first of all, by a movement to re-establish and re-affirm those moral values which are eternal, universal, and unconditionally binding. These values and norms are formulated in the *Sermon on the Mount*, as well as in the basic moral precepts of all the great religions and ethical systems.

In the light of modern knowledge, it has been clearly established that, side by side with changing local mores, there are basic moral values and norms of conduct which are universal, perennial and binding upon those societies and individuals whose aim is the good life. These timeless values have operated in all such societies in the past, and they continue to operate in the present. On the other hand, their absence is conspicuous in those groups which are in a state of disintegration and decay.

Thus the emergent Integral order of ethics and law shows itself in a trend toward the re-affirmation of universal moral values. It has manifested itself, also, in the growth of heroism, altruism and ennobled moral conduct in an increasing number of individuals, and in the organization of many movements for the abolition of war, misery and injustice, and for the improvement of man's lot. Though the main channels of publicity pay little attention to these movements, and Sensate cynics often ridicule their actions as sentimental or impractical or unrealistic, nevertheless these movements have been steadily growing in recent decades. Together with efforts to re-establish universal moral principles, such actions are the first signs of the coming spring of Integral moral order.

The Struggle in Politics, Economics and Social Life

THE double process which shows itself in the decay of Sensate institutions and cultural values and in the emergence of a new Integral order is also apparent in our political, economic and social life. The decay of the old order proceeds in two ways: 1) in the degeneration of its free, contractual institutions and enterprises into compulsory and fraudulent monsters born from the contractual parents, and 2) in the increasing obsolescence of these parental institutions, values and ideologies.

In order to grasp the full meaning of these statements, one must keep in mind that all the diverse forms of human relationships easily fall into three main classes: 1) *familistic*, permeated by mutual love, devotion and sacrifice; 2) *free contractual* agreements entered into for mutual advantage, devoid of love, hate or coercion, but profitable for all the contracting parties; and 3) *compulsory* relationships imposed by one party upon others against their wishes and interests. Of these three relationships, the familistic is the noblest, the compulsory is the worst, while the contractual occupies the intermediary position.

The proportion of each of these three types in a given society varies from group to group and from period to period. For instance, the texture of social relationships of European mediaeval society from the eighth to the twelfth centuries was mainly familistic, in lesser degree compulsory, and only slightly contractual. From the sixteenth to the middle of the eighteenth centuries the proportion of compulsory relationships notably increased. In the nineteenth century, human relationships in Western societies became predominantly contractual. In fact, this period was the golden age of contractualism, during which Western society built a comfortable Sensate house based upon covenant, contract or free agreement for the mutual advantage of its members. Its dominant system of capitalist economy was a contractual

system of economic relationships between the parties involved, the employers and the employees. This kind of economy differed from the coercive system of slavery and serfdom as well as from the system of relationships which govern the members of a good family unified into one "we" by mutual love and trust. Under a capitalistic economy each person became almost a free agent, choosing his occupation and accepting (or refusing) contractual agreements with employers or employees as he wished.

In the political field, the rise of contractual relations in the nineteenth century resulted in the elimination of autocratic, coercive governments. In their place arose democratic political regimes, whose governments were contractually elected, limited in power, and bound to respect the inalienable rights of the citizen—his life, property, and pursuit of happiness, his liberties of speech, press, religion, association, occupation, and so on. The elective principle became the main factor in recruiting rulers and public officials. Contractual government of the people, for the people and by the people largely replaced the autocratic governments which existed either by the grace of God or by violence and the will of the rulers themselves.

In addition to these economic and political institutions, practically all other important organizations also became contractual. Liberty of religion transformed church affiliations and organizations which had previously been largely coercive into free contractual bodies; one was free to join or not to join any religious organization. A similar transformation occurred within the family. Marriage was declared to be a purely civil contract between free parties, in contradistinction to a compulsory union in which the parties were selected, often against their wish, by parents or other authorities. Contractual in its establishment, marriage was also made contractual in its continuity and dissolution, in contrast to the mediaeval marriage which was indissoluble in principle. The principle of liberty and of the inalienable rights of the individual gradually permeated almost all organizations, including the military apparatus of some Western countries, which became a contractual army of free volunteers.

Unfortunately, for several important reasons which cannot be discussed here, at the beginning of the twentieth century the whole Sensate socio-cultural order began to disintegrate, and with its decay the contractual fabric of Western society also began to degenerate. Political, economic and social institutions of the West became less and less free and in many cases only served as disguises for their underlying compulsory character. After 1914, in many Euro-American nations, the contractual form of government and capitalist economy ceased to exist; in many others it became increasingly distorted by the intrusion of coercive or fraudulent simulacra of contractual systems.

Their place has been taken by various totalitarian forms of government and economy: communist, fascist, nazi, military oligarchic, and other varieties of Caesarism and dictatorship.

In the contractual society of the nineteenth century, the elective governments controlled only a small fraction of the social relationships and behavioral modes of their citizens. The economic relations of production, distribution and consumption, the choice of occupations, amusements, residence, marriage, religion, education, political affiliation, ideological preference, and so on—all these were freely decided by individuals.

In contrast to this free society, today's completely or partially totalitarian governments are self-appointed, not elected or contractual. If some of them still coerce their subjects to participate in so-called elections, these are but fraudulent imitations of real free elections. It is not individuals and private groups but government that now decides, controls and regulates almost all the behavior, ideas and relationships of its citizens. This is true of the autocratic nations of the communist bloc, and also of such countries as Turkey, Saudi Arabia, Formosa, Iran, Pakistan, South Korea, Thailand and others. In many so-called democratic countries, including Spain and Portugal and several countries of the Middle East and of Latin America, governmental regimentation is more restricted, but it has also grown far beyond the nineteenth century limits, and is still expanding. The compulsory regime of self-appointed dictators and oligarchic cliques has largely replaced nineteenth century government of the people, by the people and for the people. The free enterprise of capitalist economy is largely supplanted by governmentally managed economies.

Similar degeneration has also occurred with many democratic values, procedures and organizations. Free universal suffrage in the election of governments and in decisions of vital national problems has been either completely abolished, greatly restricted, or replaced by fraudulent substitutes. Its place has been taken either by violent seizure of power by revolutionaries and militarists, or by economic pressures and monopolistic propaganda through controlled press and radio.

In other organizations, like the family, this degenerative trend has produced a weakening of its unity, stability and sanctity. Increasing divorce, desertion, pre- and extra-marital sex relations, childless marriages, disloyalty, and decreasing love and responsibility of the husband and wife and of the parents and the children, are the indisputable manifestations of this degeneration.

Free contractual labor associations have progressively turned into compulsory government unions, or into semi-coercive political machines and "labor-racketeering gangs," autocratically manipulated by corrupt politicians and racketeers, imposing their power by fraud, threat and violence.

Finally, contractualism has degenerated shockingly in international relations. The triumph of this principle in the nineteenth century led to contractual agreements between governments, to the development of international law, and to the formation of courts of international arbitration like the Hague tribunal. These institutions effectively helped to prevent the explosion of wars and made the period from 1814 to 1914 one of the most peaceful of Greco-Roman and Western history. In 1914 this peaceful order was abruptly terminated by the First World War. The binding power of international treaties and contracts suddenly weakened, international law was disregarded and all governments, without exception, became irresponsible and faithless to commitments. Violence and fraud have become supreme arbiters in international conflicts.

In addition to this, Sensate values and institutions have declined internally, so that they have grown increasingly useless, empty and obsolescent.

Under conditions of ethical atomism and potential nihilism, contractualism tends to degenerate into lawless, amoral compulsion or pseudo-contract under duress. What is the use of solemn declarations about equality or the rights of all citizens to life, liberty and the pursuit of happiness when in actual social life there is a tremendous inequality between the power of a few multimillionaires and the dependence of the great masses, who have little political or economic independence, since they are dominated by all sorts of small and big bosses, from the foreman or ward politician on up. What is the cash-value of the freedom of the press or of other means of communication when they are monopolistically controlled by a small group of the power elite? The value of a free choice of occupation or the individual pursuit of happiness is also not great when millions of unemployed cannot find any jobs at all, and when so many can find little beauty or satisfaction in their drab lives.

The degeneration of true contractualism is also evident in the prevalence of contracts whose obligations are freely broken by either of the parties. And contracts between the members of criminal gangs, or between the bosses of industry and finance, or those between members of a labor union, which are profitable for these parties but detrimental to society as a whole, become pseudo-contracts, and the freedoms they are said to embody become but the hollow, dead shells of these values.

Similar decay has fallen also upon the principle of universal suffrage as the method of election of representatives in the government of contractual societies. If in its true function it has produced government of the people, by the people and for the people, now in its hollow form it gives instead only government of politicians, by politicians and for politicians. No wonder, therefore, that instead of regarding the franchise as a great privilege, a

large part of the voters now consider voting to be a burden and a waste of time. They prefer not to bother themselves with this nuisance and do not vote even in elections of the chiefs of state. Depreciation of the value of voting has gone so far that in a number of states citizens are coerced to vote under the penalty of law; a failure to vote has been made a punishable crime! This fact alone is sufficient witness that the elective principle has been degraded from the rank of a great privilege to that of an unpleasant burden which has to be coercively imposed if it is to be exercised at all.

Similar signs of obsolescence can be observed in many of the political and social concepts which Sensate sociocultural order evolved in its creative period. Whether they are the ideologies of Lock, Rousseau or Marx, whether variations of democratic, liberal, progressive, conservative, socialist, syndicalist or communist systems, whether the aim be that of equality, freedom, free enterprise, planned economy, the welfare society or the new deal—all these ideologies which previously inspired millions of their followers with great enthusiasm are at present almost dead. Their truths are exposed as errors, their fire is gone, and their ashes are cold. As a result, at the present time most of the nations do not have any living, creative ideology which successively meets the challenge of our times and wisely points the safe road to the future. All that they have to offer is a warmed-over concoction of odds and ends, the remnants of a once-great ideology of responsible government and free contractual enterprise. If we are living in an age of confusion, this is particularly true of the field of politics.

NOW that the trend of decline of Sensate political institutions, values, and ideologies has been outlined, let us glance at a brighter picture: the signs of emergence of a new, Integral sociopolitical order.

This new order is based on two realities: modern scientific knowledge, and the accumulated wisdom of humanity. It is animated not by the struggle for existence and by general competition and rivalry, but by the spirit of universal friendship, sympathy, and unselfish love which fosters mutual aid—of everyone for everyone.

So far there are only a few and comparatively modest beginnings of this new order which can be noted.

First, while the contractual order of the West crumbles and is being replaced by coercive totalitarianism, many Asiatic and African societies have passed from a dominant coercive order to a freer contractual system of social and political organization.

Such transition has been experienced by previously colonial peoples, like India, Indonesia, Pakistan, Tunis, Morocco and others, who have re-

gained their political and social independence. In this way the regressive political change in the West is somewhat compensated by the progressive political transformation of many Asiatic, African and other societies.

Second, while the contractual order in international relations has largely passed away, several new international institutions, as exemplified by the United Nations, have emerged and are trying to build a world-wide contractual order to replace the parochial agreements between particular governments. Despite their many grave defects, such international institutions nevertheless contain great potentialities. They can develop into important agencies of international peace, and bring about the unification of separate states into, at least, a loosely coordinated world-community.

Third, and most important, is the change indicated by the fact that not everything is coercive and fraudulent in the totalitarian and oligarchic regimes that supplanted the contractual order. Though the total fabric of these regimes is largely compulsory, it contains, in addition, a considerable portion of familistic relationships. Such a situation may be observed, for example, in the U.S.S.R. This means that the degeneration of the contractual order of the nineteenth century into totalitarianism has not been totally regressive; parts of the previously contractual relationships have been transformed into nobler familistic relationships. These familistic relationships are, in fact, the "hidden power" which gives totalitarian systems what strength, prestige and partial justification they have. Without their unifying effect, the purely coercive aspects of the Soviet, Chinese and other coercive-familistic societies of our times would have fallen to pieces long ago.

Side by side with the inhuman regimentation and enslavement of millions of their citizens, the Soviet and similar regimes have liberated these millions from many forms of subjugation and exploitation they had previously suffered. By their policies of collectivization, nationalization and partial equalization, these regimes have evoked in their citizens not only the mentality and behavior of regimented and enslaved prisoners, but also the ethos and the conduct of a free, collective "we," spontaneously united into one vast family by sympathy and responsibility, by mutual aid, free cooperation and unselfish love. Such a community is something quite different from the lonely crowds of today's contractual and obligarchic societies; in the familistic communities there are few, if any, isolated individuals engrossed in their own selfish ambitions and rivalries, careless of others and uncared for by anyone.

It is this energy of unselfish love, whether it be primitive or pure, which animates, motivates and empowers the familistic forms of human behavior, relationships and organizations.

This explains why a transformation of some con-

tractual relationships into familistic ones is so important. Among the coarse weeds of totalitarian regimes and among the wilted and dried-up grasses of democratic societies, the appearance of a few small green shoots of familistic relationship signifies the beginnings of a new growth which can fructify the earth anew.

Fourth, familistic social institutions are proliferating not only in totalitarian but also in democratic nations in such forms as movements toward the welfare state, progressive republicanism, and liberal democracy. There has been a growth of various familistic associations like the Hutterites and the Friends' community, and of social service, cooperation and mutual aid in many different forms. All rapidly growing familistic relationships, communities, brotherhoods and sociocultural institutions are indeed the forerunners of the new Integral sociocultural order. If it continues to its full development, this order promises to be nobler and finer than the coercive and contractual orders of the past.

This emerging Integral order also implies several radical changes in the governments of the states, in big business corporations, labor unions, and other powerful organizations.

Three significant trends in the qualifications needed for government under this order may already be observed.

The first of these manifests itself in the rapidly increasing role of scientists and experts in planning, developing, controlling and executing an ever-larger part of government activities.

Many of the top rulers of governments, corporations and labor unions have become figureheads rather than self-willed, energetic rulers. Their policies show that they have in large part become merely the executors of the "silent orders" laid down by recent scientific discoveries and inventions. Before 1940 none of the men who were then in power, and none of those who have since come into power, had the slightest inkling of the atomic and outer-space policies now being carried out. In this sense, today's statesmen and politicians are increasingly becoming figureheads—executors of the programs which science and technology have created.

Such a trend portends the eventual withering of existing governments of politicians, by politicians, and for politicians, and their replacement by governments of scientists and experts. Considering, however, the moral neutrality of science, good government needs the service of balanced and wise men to integrate the narrow knowledge of scientific specialists and use it for good purposes. Without such guidance by sages and saints, the government of scientific experts may turn out to be even more disastrous than the government of politicians.

The foregoing considerations explain why gov-

ernments so badly need to have their policies guided by universal and eternal moral imperatives.

The Trend in Fine Arts

THE decay of the over-ripe Sensate fine arts manifests itself in many ways. First of all in its decreasing creativity. Its creative giants were all in the past. In music, Palestrina, Monteverde, Purcell, Lully, Rameau, Couperin, Bach, Mozart, Handel and many others lived before or in the eighteenth century; Haydn and Beethoven at the very beginnings of the nineteenth century. The later part of the nineteenth century also had its creators in music: Schubert, Schumann, Chopin, Berlioz, Wagner, Brahms, Tchaikovsky and others, but even they were no longer of the stature of Bach, Mozart or Beethoven. The twentieth century has produced scarcely any composers equal to the masters of the nineteenth century. Similarly, in literature, creative giants like Shakespeare, Goethe, Balzac, Tolstoy, Dostoevsky, Melville and Whitman belong to the past; the greatest literary figures of our century, exemplified by the Nobel prize winners, are pigmies in comparison.

The situation is similar in painting and sculpture, in drama, and in the other fine arts. "When there is no real fish, a crawfish is a fish," says a Russian proverb. We seem to have plenty of crawfish of all sizes, but hardly any really big fish.

In the Ideational and Integral periods, and at the creative stage of Sensate culture, the fine arts were regarded as an end-value, indissolubly bound up with such other supreme values as God, truth, goodness, and the majesty of absolute beauty itself. In contrast to this point of view, art has today become a commodity, manufactured primarily for the market, motivated mainly by *humanae laudis amore* and *temporalis praemii cupiditate* (for the love of human praising, for temporary profitable cupidity), and aimed almost exclusively at utility, relaxation or amusement. Market demands cannot but be vulgar; therefore such an art cannot escape vulgarization. Instead of elevating the masses to its own level, it sinks to theirs. The extreme vulgarization of Sensate pseudo-art is a further evidence of its creative decline. Sales of recordings of great musical masterpieces cannot compete with the many millions of copies of "rock 'n roll" and similar sham-music. None of the greatest singers can approach in popularity or reward the legion of "voiceless voices" whose singing is mainly a crooning, bleating, mewling or yelling. While the great masterpieces of literature seem to be read less and less, sadistic pulp literature of murder, violence and pornography are sold in hundreds of millions of copies.

Sensate art in its decadence is also characterized by its morbid concentration on pathological types. From the realm of the Kingdom of God in Ideational mediaeval art, Western art has declined,

through the realm of heroic, semi-divine human society, to the world of normal human beings, and finally, in our time, to society's dregs. It is now the sub-human population of criminals, perverts, racketeers, hucksters and crooked politicians who are the personages and "heroes" of today's art.

Typical again of the decadent phase of Sensate art is the contemporary substitution of quantity for quality, of a best-seller for a classic, of technique for genius, of a short-lived sensational "hit" for an immortal masterpiece.

Side by side with this decay of Sensate art, we can see the emergence of a modern art which is the first expression of a new, Integral form, and which is significant as a manifestation against empty Sensate art, and as a search for new vitality. Modern art is clearly in quest of a new concept of beauty, but, with a few happy exceptions, it is still adrift on an uncharted ocean and has not yet arrived at its promised land. In spite of this, the revolt against senile Sensate art and the effort to create new art forms are the forerunners of, and contributors to, an emerging Integral art. These efforts are already succeeding in creating works of Integral beauty, as yet imperfect, but which nonetheless foreshadow an art that will reunite truth and goodness, lend meaning to experience, beautify the ugly, immortalize the mortal, ennoble the ignoble, and prove to be enlightening, uplifting and spiritually inspiring.

The Reunification of Truth, Goodness and Beauty

IN concise outline, these are the three great trends of our time. If they are adequately grasped, thousands of single events and changes which happen every day become comprehensible; some can even be foreseen and predicted.

Among other things, we can see that the new rising sociocultural order promises to shelter a spontaneous unification of religion, philosophy, science, ethics and the fine arts into one integrated system of values based on truth, goodness and beauty. Such a unification implies the end of the conflict between science and the humanities which has characterized the over-ripe Sensate order. In terms of Saint Simon's theory of the "critical" and "organic" periods in the life of great cultures, this unification means the beginning of a new organic era in the history of mankind.

This struggle between the forces of the now largely outworn Sensate order and the emerging new Integral order is proceeding relentlessly in all the social and cultural fields, and in the inner life of everyone. The final outcome of this epochal struggle will depend to large extent upon whether mankind can avoid a new world war. If this Apocalyptic catastrophe can be avoided, then the emerging creative forces will usher humanity into a magnificent era of its history.

A NEW TABLE OF THE ELEMENTS

Bertrand A. Landry

"WHO will say that man's three-dimensional space, deemed infinite by him, is not (in)finite but curved in four dimensions?"¹ A two-dimensional being roaming on the surface of a three-dimensional sphere would conclude that its space is infinite in two dimensions. It could happen, however, that one of these beings would observe that starting from a certain point and always moving in the same direction, he would return to the point of departure. When this experiment had been repeated a large number of times with the same result, *independently* of the original direction taken, the conclusion would be inescapable that the two-dimensional space was not infinite but finite and curved in three dimensions. Subsequently, perhaps, a geometer, among these intelligent two-dimensional beings, would triangulate a large area of their world and discover that the sum of the three included angles was not the 180 degrees of a plane triangle. It is hoped that with this discovery the skeptics would be convinced. . . .

If our three-dimensional universe is curved in four dimensions, what evidence to demonstrate this can be uncovered? Circumnavigation and triangulation do not appear to be available methods at the present time. A third method, which does not seem to have been suggested so far, would be to study the characteristics of the atoms forming the universe on the basis that curvature of the whole requires curvature of the parts down to the ultimate particles.

Studies of this type have been made by the present author which reveal a considerable body of evidence for the hypothesis of four-dimensional curvature. One of the results obtained, which is a new table of the elements, is presented in this paper.

Table 1* shows in abridged form the modern Mendeleev table of the elements as arranged by Hubbard but extended beyond Element 104 (the last element discovered) to show the relative positions of elements, not yet tabulated, up to Element 142. The table obviously could be extended indefinitely, suggesting that the number of elements

A Four-Dimensional Approach

could be infinite. It is to be noted that the table has no place for the first series of rare earths (third completed line from bottom) which belongs between La 57 and Hf 72, and no place for the second series of rare earths, (second line from bottom) which belongs between Ac 89 and Element 104. Similarly, there would be no place for the third hypothetical series of rare earths (first line from bottom) between Elements 121 and 136.

Seaborg² has predicted the chemical properties of the elements to Element 118 in agreement with Table 1. Element 118 is postulated to correspond to radon (Rn) in its properties.

Arrangement of the Elements in Symmetrical Groups

CAN the Mendeleev table be so modified as to preserve the periodicity of chemical properties exhibited by the successive columns and yet show that the total number of possible elements is finite? The method employed to arrive at an answer to this question was to rearrange the elements in each column in symmetrical finite groups and simultaneously to exclude supernumerary elements not needed to complete the symmetry. Table 2 (a) shows for Groups 1 to 8 inclusive and Table 2 (b) for Group 9 the interesting symmetry obtained by including elements only up to No. 120. It is seen that Group 1 can be completed by the inclusion of Element 111 whose properties would correspond to those of gold (Au). Similarly, Element 112 completes Group 2, the properties of this element corresponding to those of mercury (Hg). The third group is of interest because both of the known series of rare earths appear in this group without being relegated to the outer confines of the table as in the Mendeleev table.

Of particular interest is the final group, Group 9, as it shows the places occupied by Elements 119 and 120 as obtained by the rule of symmetry. Element 119 would have the properties of platinum (Pt) and Element 120 those of iridium (Ir), by this arrangement. This is a markedly different result from the predicted properties of these elements based on the extended Mendeleev table, as this requires that Element 119 correspond to the

* Illustrations follow the text.

alkali metals Li, Na, K, Rb, Cs, and Fr, and Element 120 to the alkaline-earth metals, Ca, Sr, Ba, and Ra, and not to the noble metals. Of further interest is the clarification that Group 9 brings to the properties of the noble metals. The Mendeleev chart suggests that Co, Rh, and Ir have similar properties and that Ni, Pd, and Pt also have similar properties. The properties are better described, however, if Co, Ni, and Rh are considered to form one group, and Ir, Pd, and Pt another group. The central position of Ni with respect to Co and Rh and of Pd with respect to Ir and Pt can be illustrated by the facts that the melting point of Ni is lower than that of Co and of Rh, and the melting point of Pd is lower than that of Ir and of Pt. As for the chemical property of valency, the maximum valency of Ni to F is 2, whereas that of Co is 3 and that of Rh also is 3; similarly, the corresponding valency of Pd is 3, whereas that of Ir is 6 and that of Pt is 4. Finally, Ni has 5 stable isotopes, whereas Co and Rh have each only one; and Pd has 6 stable isotopes, Ir has 2, and Pt has 5. The presence of helium (He) in this group is only for convenience, as will be explained later. It would be expected that Elements 109, 110, 119, and 120 will show even greater "nobility" or resistance to chemical attack than the ordinary noble metals.

What is the Significance of Number 120?

IT will be recalled that one of the objectives of this paper was to find evidence for the existence of the elements in a four-dimensional world. In this instance, the number 120 supplies the clue. It is well known that in three-dimensional Euclidean space there are only five regular polyhedra: the tetrahedron, the cube, the octahedron, the dodecahedron, and the icosahedron. These regular polyhedra have as faces, respectively, four equilateral triangles, six squares, eight equilateral triangles, twelve pentagons, and twenty equilateral triangles. Four-dimensional space can be said inherently to possess greater symmetry than three-dimensional space, as, in this space, there are six regular "polyhedra" instead of five. (In five-dimensional space and higher, there are only three regular polyhedra.)³ The "faces" of the four-dimensional polyhedra are not two-dimensional, as they are for the three-dimensional polyhedra, but are three-dimensional. The number of "faces" and the three-dimensional polyhedra constituting each "face" are as follows: (1) 5 tetrahedra, (2) 8 cubes, (3) 16 tetrahedra, (4) 24 octahedra, (5) 120 dodecahedra, and (6) 600 tetrahedra. The numbers of interest here are: 5, 8, 16, 24, 120, and 600, that is, the number of "faces" on the six regular four-dimensional polyhedra. If we suppose, therefore, that all of the 120 possible elements hypothesized above form a symmetric group in four-dimensional space, we find that there is a four-dimensional poly-

hedron that has exactly the right number of faces, one face for each element, to support this group. In this representation, each element is a dodecahedron, represented in Figure 1, a remarkably beautiful geometrical figure.

Inasmuch as we are three-dimensional beings, we cannot "see" four-dimensional objects. Similarly, a two-dimensional being could not "see" three-dimensional figures; for such a being, a cubical box would appear as in Figure 2: he would actually see a large square (the top) framing a smaller square (the bottom) and 4 trapezoids (the four sides). Note that the four square sides have become distorted.

Figure 3 shows, by analogy, how we might "see" a four-dimensional "cubical" box: we would see a small cube surrounded by six distorted cubes, all comprised within a large cube, the total number of cubes adding to eight "faces." To picture the four-dimensional object having 120 dodecahedra for its "faces," we can imagine that what we would see would be a large undistorted dodecahedron, such as the one shown in Figure 1. At the center of this dodecahedron, we would see another much smaller undistorted dodecahedron; arranged outwardly from the small dodecahedron would be various groups of distorted dodecahedra terminating at the outer dodecahedron. Like the two-dimensional being who sees only two nondistorted squares when looking at a cubical box, we would see only two nondistorted dodecahedra; the remaining 118 would be distorted in various ways.

A New Table of the Elements

IT will have been observed that each of the elements in the nine groups of Figure 2 was associated with either a triangle or a diamond (lozenge). The reason for this choice will now become apparent. The new table of elements to be presented has to be derived from a three-dimensional structure or edifice in which each element is represented by a bipyramidal unit whose shape is illustrated in Figure 4(a). This bipyramid has eight triangular faces, the relative dimensions of each face being as shown in Figure 4(b). The total relative height of the bipyramid, on the same scale, is 6, and the length of the diagonal across the square base is $\sqrt{72}$ or $2\sqrt{18}$. By employing these dimensions, it is possible to fit such bipyramids in compact structures. Figure 5 illustrates the method. The four bipyramids shown in the process of being fitted together are He, from Group 9; Li from Group 1; Be from Group 2; and B from Group 3. Continuing this process to Element 120, in accordance with the arrangement of the nine groups of Table 2, leads to a three-dimensional structure of which Figure 6 shows a top view and a side elevation. Obviously, this method of representing the entire group of 120 elements is unsatis-

factory, from the point of view of clarity, as many elements are hidden from view. To show all of the elements and, therefore, their relation to one another, it is necessary to pull the structure apart and show its various levels separately.

Table 3 presents the new table of the elements obtained by separating the structure shown in Figure 6 into its component levels. The lowest level has been placed in the center. The next (upper) level is separated into two parts placed respectively below and above the center group. The top level, which comprises the two series of rare earths has been similarly separated into two parts shown at the bottom and the top of the figure.

In contrast with the Mendeleev table, the new table starts at the center, whereas the older table starts at the corner. The symmetry of the groups, previously established in Table 2, is maintained and it is seen that Elements 109, 110, 119 and 120 do complete the symmetry. Groups of elements having similar chemical properties are now associated sometimes on one horizontal line, such as Cu, Ag, Au, and No. 111, and sometimes on two horizontal lines (Li, Na, and K, Rb, Cs, Fr). In the latter instance, there exists also a vertical association as, for example, Ne-Xe, A-Kr, F-I, Cl-Br. In the older table, similar chemical properties are, in principle, grouped only vertically. The new table shows, in particular, that Co, Ni, and Rh belong on the same horizontal line, in agreement with their chemical properties, whereas the older table succeeds in placing Co and Rh only on one column and thus does not relate Ni to Co directly.

In view of the greater degree of orderliness in the new table, it is possible to show relations of crystallization properties more easily, when they exist. This is accomplished by relating the elements forming simple compounds by horizontal or oblique lines. In many instances, of course, the two tables show similar simple relations; thus, in one cubic system, we find NaCl and LiF, and KBr and RbI, and in another cubic system, CuBr and AgI. All three of these pairs can be related by joining the elements by lines of similar slopes either on one table or the other. But, for the older table, this process does not apply for AgBr and LiCl, and for CuPd and CsCl (cubic systems) and for MgTe and ZnO and for MgBr₂ and CdI₂ (hexagonal system), whereas the process can be used in the new table.

It will be noted that although the new table apparently finds its rightful place for helium (He), hydrogen (H) is left out, as it is, actually, in the Mendeleev table. The reason for this will now be discussed.

The Position of Helium and Hydrogen

IN the picturization of the 120 elements as a four-dimensional dodecahedron hydrogen would be favored with the outside position as it can be considered as at the origin of all elements and thus comprises all of them. Helium would occupy the central position.

"The secret sits in the middle and knows."
(Robert Frost)

Arranged around helium there would be successive groups of elements represented by distorted dodecahedra. The arrangement of these successive groups would associate periodicity of properties with the symmetry of the figure.

In this light, Figure 6, showing the edifice of the elements, can be considered as an alternative three-dimensional projection of the four-dimensional structure. By the representation of Figure 6 no element is distorted but each is represented by the bipyramid, Figure 4 (a). From this representation, it is possible to arrive at a model of atoms and molecules from which it is possible to predict many and perhaps all of their physical and chemical properties.

Conclusion

USING the known periodic properties of existing elements and the properties postulated by Seaborg for the elements up to number 118, symmetrical group arrangements have been formed which predict that the total possible number of elements is finite and equal to 120.

A new table of the elements, prepared on this basis, exhibits relations between elements that preserve the good points of the Mendeleev table but adds new important relations.

The number of possible elements, 120, is shown to correspond to the number of "faces" of a four-dimensional dodecahedron, indicating that the elements form a four-dimensional space group and suggesting that our three-dimensional world is indeed finite but curved in four dimensions.

Other evidence for this thesis, some of it far more compelling, will be presented in other papers.

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- (1) Margenau, Henry: *The Nature of Physical Reality*, McGraw Hill, 1950, p. 164.
- (2) Seaborg, Glenn T.: *Man Made Elements*, Proceedings of the Robert A. Welch Foundation Conferences on Chemical Research. I. The Structure of the Nucleus. Houston, Texas, 1958, p. 11.
- (3) Hilbert, D., and Cohn-Vossen, S.: *Auschauliche Geometrie*, Verlag von Julius Springer, Berlin, 1932, p. 127 ff.

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1 H								2 He														
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne															
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar															
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni													
29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr															
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd													
47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe															
55 Cs	56 Ba	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu						
72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt																
79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn															
87 Fr	88 Ra	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr						
104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Lv	116 Ts	117 Og									
118 Uue	119 Uub	120 Uut	121 Uuq	122 Uubh	123 Uuql	124 Uubh	125 Uuql	126 Uuhc	127 Uuhq	128 Uuhv	129 Uuht	130 Uuql	131 Uuhc	132 Uuhq	133 Uuhv	134 Uuhc	135 Uuhq					
136 Uuh	137 Uuh	138 Uuh	139 Uuh	140 Uuh	141 Uuh	142 Uuh																
.														
158 Ce	159 Pr	160 Nd	161 Pm	162 Sm	163 Eu	164 Gd	165 Tb	166 Dy	167 Ho	168 Er	169 Tm	170 Yb	171 Lu									
190 Th	191 Pa	192 U	193 Np	194 Pu	195 Am	196 Cm	197 Bk	198 Cf	199 Es	200 Fm	201 Md	202 No	203 Lr									
122	123	124	125	126	127	128	129	130	131	132	133	134	135									
.									

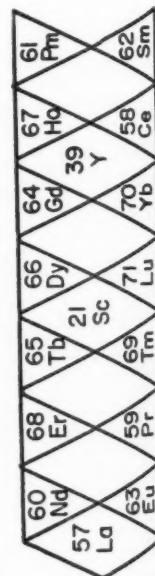
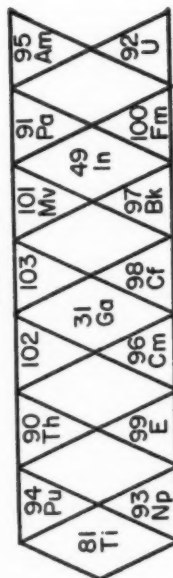
Group 1



Group 2



Group 3



Group 4



Group 5

<div>AC</div> <div>62 Sm</div> <div>58 Ce</div> <div>70 Yb</div> <div>71 Lu</div> <div>69 Tm</div> <div>59 Pr</div> <div>63 Eu</div> <div>La</div>	<div>72 Hf</div> <div>Ti</div> <div>Zr</div>
<div>Group 6</div> <div>84 Po</div> <div>34 Se</div> <div>116</div> <div>8 O</div> <div>52 Te</div> <div>16 S</div> <div>42 Mo</div> <div>24 Cr</div> <div>106</div> <div>74 W</div>	<div>115</div> <div>51 Sb</div> <div>7 N</div> <div>15 P</div> <div>33 As</div> <div>83 Bi</div> <div>105</div> <div>41 Nb</div> <div>23 V</div> <div>73 Ta</div>
<div>Group 8</div> <div>86 Rn</div> <div>36 Kr</div> <div>54 Xe</div> <div>118</div> <div>18 Ar</div> <div>10 Ne</div> <div>44 Ru</div> <div>108</div> <div>76 Os</div>	<div>Group 7</div> <div>85 At</div> <div>35 Br</div> <div>53 I</div> <div>117</div> <div>17 Cl</div> <div>9 F</div> <div>43 Tc</div> <div>107</div> <div>25 Mn</div> <div>75 Re</div>

Table 2(a).

Group 9				
120	77 Ir	46 Pd	78 Pt	119
		2 He		
110	27 Co	28 Ni	45 Rh	109

TABLE 2(b)

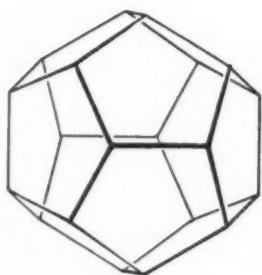


FIGURE 1.

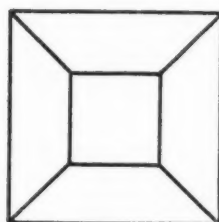


FIGURE 2.
Reference 3

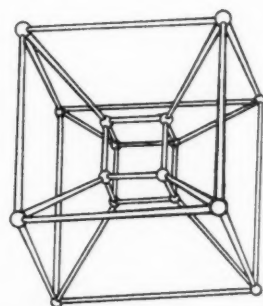


FIGURE 3.

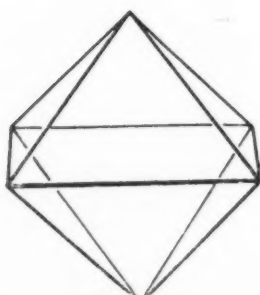


FIGURE 4(a).
PERSPECTIVE VIEW OF
BASIC BI-PYRAMID UNIT

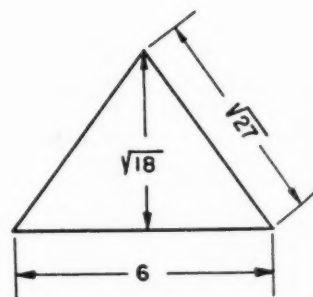
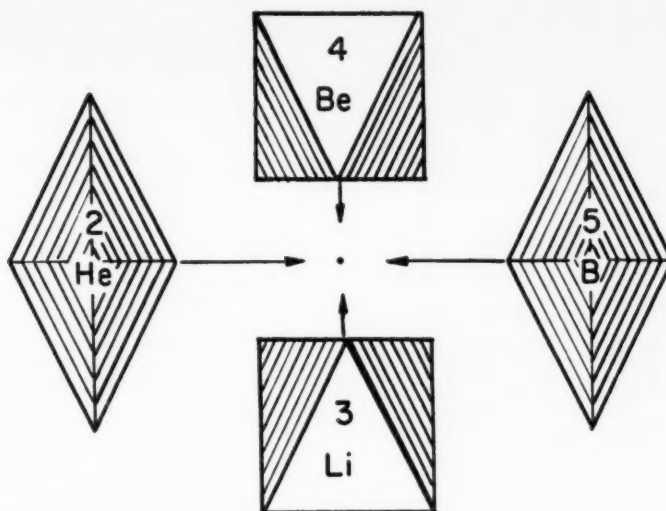
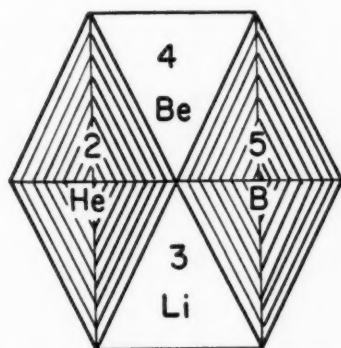


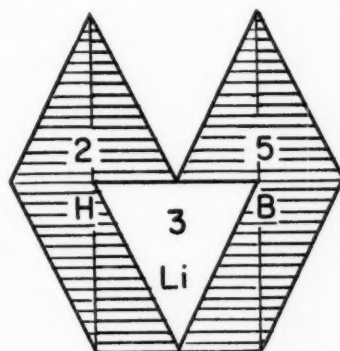
FIGURE 4(b).
RELATIVE DIMENSIONS
OF ONE TRIANGULAR FACE



EXPLODED VIEW OF ASSEMBLY OF HE-LI-BE-B



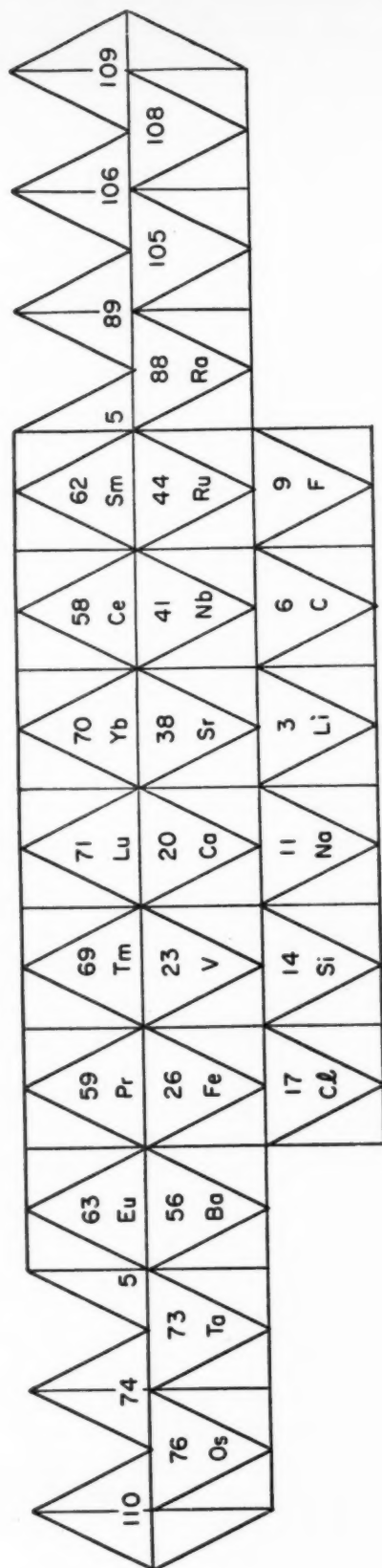
TOP VIEW OF HE-LI-BE-B ASSEMBLY



SIDE VIEW OF ABOVE

FIGURE 5. ASSEMBLY OF FOUR BI-PYRAMIDAL UNITS TO ILLUSTRATE METHOD OF ASSEMBLY OF EDIFICE OF THE ELEMENTS

Top View of Completed Edifice of the Elements



Side Elevation of Above
FIGURE 6. EDIFICE OF THE ELEMENTS

Side Elevation of Above
FIGURE 6. EDIFICE OF THE ELEMENTS

94 Pu	90 Th	102	103	101 Mv	91 Pa	95 Am
93 Np	99 E	96 Cm	98 Cf	97 Bk	100 Fm	92 U
86 Rn	83 Bi	33 As	30 Zn	48 Cd	51 Sb	54 Xe
85 At	82 Pb	32 Ge	29 Cu	47 Ag	50 Sn	53 I
84 Po	81 Tl	34 Se	31 Ga	46 Pd	49 In	52 Te
83 Bi	80 Hg	36 Kr	33 As	48 Cd	51 Sb	54 Xe
82 Pb	79 Au	35 Br	32 Ge	47 Ag	50 Sn	53 I
81 Tl	77 Ir	34 Se	31 Ga	46 Pd	49 In	52 Te
80 Hg	79 Au	35 Br	32 Ge	47 Ag	50 Sn	53 I
79 Au	77 Ir	34 Se	31 Ga	46 Pd	49 In	52 Te
78 Pt	75 Os	33 As	30 Zn	48 Cd	51 Sb	54 Xe
77 Ir	74 W	32 Ge	29 Cu	47 Ag	50 Sn	53 I
76 Os	73 Ta	31 Ga	28 Ni	46 Pd	49 In	52 Te
75 Re	72 Hf	30 Zn	27 Co	45 Rh	48 Cd	51 Sb
74 W	71 Lu	29 Cu	26 Fe	44 Ru	47 Ag	50 Sn
73 Ta	70 Yb	28 Ni	25 Mn	43 Tc	46 Pd	49 In
72 Hf	69 Tm	27 Co	24 Cr	42 Mo	45 Rh	48 Cd
71 Lu	68 Er	26 Fe	23 V	41 Nb	44 Ru	47 Ag
70 Yb	67 Ho	25 Mn	22 Ti	40 Zr	43 Tc	46 Pd
69 Tm	66 Dy	24 Cr	21 Sc	39 Y	42 Mo	45 Rh
68 Er	65 Tb	23 V	20 Ca	38 Sr	41 Nb	44 Ru
67 Ho	64 Gd	22 Ti	19 K	37 Rb	40 Zr	43 Tc
66 Dy	63 Eu	21 Sc	18 Ar	36 Kr	39 Y	42 Mo
65 Tb	62 Sm	20 Ca	17 Cl	35 Br	38 Sr	41 Nb
64 Gd	61 Pm	19 K	16 S	34 Se	37 Rb	40 Zr
63 Eu	60 Nd	18 Ar	15 P	33 As	36 Kr	39 Y
62 Sm	59 Pr	17 Cl	14 Si	32 Ge	35 Br	38 Sr
61 Pm	58 Ce	16 S	13 Al	31 Ga	34 Se	37 Rb
60 Nd	57 La	15 P	12 Mg	30 Zn	33 As	36 Kr
59 Pr	56 Ba	14 Si	11 Na	29 Cu	32 Ge	35 Br
58 Ce	55 Cs	13 Al	10 Ne	28 Ni	31 Ga	34 Se
57 La	54 Xe	12 Mg	9 F	27 Co	30 Zn	33 As
56 Ba	53 I	11 Na	8 O	26 Fe	29 Cu	32 Ge
55 Cs	52 Te	10 Ne	7 N	25 Mn	28 Ni	31 Ga
54 Xe	51 Sb	9 F	6 C	24 Cr	27 Co	30 Zn
53 I	50 Sn	8 O	5 B	23 V	26 Fe	29 Cu
52 Te	49 In	7 N	4 Be	22 Ti	25 Mn	28 Ni
51 Sb	48 Cd	6 C	3 Li	21 Sc	24 Cr	27 Co
50 Sn	47 Ag	5 B	2 He	20 Ca	23 V	26 Fe
49 In	46 Pd	4 Be	1 H	19 K	22 Ti	25 Mn
48 Cd	45 Rh	3 Li		18 Ar	21 Sc	24 Cr
47 Ag	44 Ru	2 He		17 Cl	20 Ca	23 V
46 Pd	43 Tc	1 H		16 S	19 K	22 Ti
45 Rh	42 Mo			15 P	18 Ar	21 Sc
44 Ru	41 Nb			14 Si	17 Cl	20 Ca
43 Tc	40 Zr			13 Al	16 S	19 K
42 Mo	39 Y			12 Mg	15 P	18 Ar
41 Nb	38 Sr			11 Na	14 Si	17 Cl
40 Zr	37 Rb			10 Ne	13 Al	16 S
39 Y	36 Kr			9 F	12 Mg	15 P
38 Sr	35 Br			8 O	11 Na	14 Si
37 Rb	34 Se			7 N	10 Ne	9 F
36 Kr	33 As			6 C	9 F	8 O
35 Br	32 Ge			5 B	8 O	7 N
34 Se	31 Ga			4 Be	7 N	6 C
33 As	30 Zn			3 Li	6 C	5 B
32 Ge	29 Cu			2 He	5 B	4 Be
31 Ga	28 Ni			1 H	4 Be	3 Li
30 Zn	27 Co				3 Li	2 He
29 Cu	26 Fe				2 He	1 H
28 Ni	25 Mn				1 H	
27 Co	24 Cr					
26 Fe	23 V					
25 Mn	22 Ti					
24 Cr	21 Sc					
23 V	20 Ca					
22 Ti	19 K					
21 Sc	18 Ar					
20 Ca	17 Cl					
19 K	16 S					
18 Ar	15 P					
17 Cl	14 Si					
16 S	13 Al					
15 P	12 Mg					
14 Si	11 Na					
13 Al	10 Ne					
12 Mg	9 F					
11 Na	8 O					
10 Ne	7 N					
9 F	6 C					
8 O	5 B					
7 N	4 Be					
6 C	3 Li					
5 B	2 He					
4 Be	1 H					
3 Li						
2 He						
1 H						

18 Ar	15 P	12 Mg	10 Ne
17 Cl	14 Si	11 Na	9 F
16 S	13 Al	12 Mg	10 Ne
15 P	14 Si	11 Na	9 F
14 Si	13 Al	12 Mg	10 Ne
13 Al	12 Mg	11 Na	9 F
12 Mg	11 Na	10 Ne	9 F
11 Na	10 Ne	9 F	8 O
10 Ne	9 F	8 O	7 N
9 F	8 O	7 N	6 C
8 O	7 N	6 C	5 B
7 N	6 C	5 B	4 Be
6 C	5 B	4 Be	3 Li
5 B	4 Be	3 Li	2 He
4 Be	3 Li	2 He	1 H
3 Li	2 He	1 H	
2 He	1 H		
1 H			

75 Re	72 Hf	55 Cs	25 Mn	19 K	37 Rb	87 Fr	107
74 W	71 Lu	54 Xe	24 Cr	18 Ar	36 Kr	86 Rn	106
73 Ta	70 Yb	53 I	23 V	17 Cl	35 Br	85 At	105
72 Hf	69 Tm	52 Te	22 Ti	16 S	34 Se	84 Po	104
71 Lu	68 Er	51 Sb	21 Sc	15 P	33 As	83 Bi	103
70 Yb	67 Ho	50 Sn	20 Ca	14 Si	32 Ge	82 Pb	102
69 Tm	66 Dy	49 In	19 K	13 Al	31 Ga	81 Tl	101
68 Er	65 Tb	48 Cd	18 Ar	12 Mg	30 Zn	80 Hg	100
67 Ho	64 Gd	47 Ag	17 Cl	11 Na	29 Cu	79 Au	99
66 Dy	63 Eu	46 Pd	16 S	10 Ne	28 Ni	78 Pt	98
65 Tb	62 Sm	45 Rh	15 P	9 F	27 Co	77 Ir	97
64 Gd	61 Pm	44 Ru	14 Si	8 O	26 Fe	76 Os	96
63 Eu	60 Nd	43 Tc	13 Al	7 N	25 Mn	75 Re	95
62 Sm	59 Pr	42 Mo	12 Mg	6 C	24 Cr	74 W	94
61 Pm	58 Ce	41 Nb	11 Na	5 B	23 V	73 Ta	93
60 Nd	57 La	40 Zr	10 Ne	4 Be	22 Ti	72 Hf	92
59 Pr	56 Ba	39 Y	9 F	3 Li	21 Sc	71 Lu	91
58 Ce	55 Cs	38 Sr	8 O	2 He	20 Ca	70 Yb	90
57 La	54 Xe	37 Rb	7 N	1 H	19 K	69 Tm	89
56 Ba	53 I	36 Kr	6 C		18 Ar	68 Er	88
55 Cs	52 Te	35 Br	5 B		17 Cl	67 Ho	87
54 Xe	51 Sb	34 Se	4 Be		16 S	66 Dy	86
53 I	50 Sn	33 As	3 Li		15 P	65 Tb	85
52 Te	49 In	32 Ge	2 He		14 Si	64 Gd	84
51 Sb	48 Cd	31 Ga	1 H		13 Al	63 Eu	83
50 Sn	47 Ag	30 Zn			12 Mg	62 Sm	82
49 In	46 Pd	29 Cu			11 Na	61 Pm	81
48 Cd	45 Rh	28 Ni			10 Ne	60 Nd	80
47 Ag	44 Ru	27 Co			9 F	59 Pr	79
46 Pd	43 Tc	26 Fe			8 O	58 Ce	78
45 Rh	42 Mo	25 Mn			7 N	57 La	77
44 Ru	41 Nb	24 Cr			6 C	56 Ba	76
43 Tc	40 Zr	23 V			5 B	55 Cs	75
42 Mo	39 Y	22 Ti			4 Be	54 Xe	74
41 Nb	38 Sr	21 Sc			3 Li	53 I	73
40 Zr	37 Rb	20 Ca			2 He	52 Te	72
39 Y	36 Kr	19 K			1 H	51 Sb	71
38 Sr	35 Br	18 Ar				50 Sn	70
37 Rb	34 Se	17 Cl				49 In	69
36 Kr	33 As	16 S				48 Cd	68
35 Br	32 Ge	15 P				47 Ag	67
34 Se	31 Ga	14 Si				46 Pd	66
33 As	30 Zn	13 Al				45 Rh	65
32 Ge	29 Cu	12 Mg				44 Ru	64
31 Ga	28 Ni	11 Na				43 Tc	63
30 Zn	27 Co	10 Ne				42 Mo	62
29 Cu	26 Fe	9 F				41 Nb	61
28 Ni	25 Mn	8 O				40 Zr	60
27 Co	24 Cr	7 N				39 Y	59
26 Fe	23 V	6 C				38 Sr	58
25 Mn	22 Ti	5 B				37 Rb	57
24 Cr	21 Sc	4 Be				36 Kr	56
23 V	20 Ca	3 Li				35 Br	55
22 Ti	19 K	2 He				34 Se	54
21 Sc	18 Ar	1 H				33 As	53
20 Ca	17 Cl					32 Ge	52
19 K	16 S					31 Ga	51
18 Ar	15 P					30 Zn	50
17 Cl	14 Si					29 Cu	49
16 S	13 Al					28 Ni	48
15 P	12 Mg					27 Co	47
14 Si	11 Na					26 Fe	46
13 Al	10 Ne					25 Mn	45
12 Mg	9 F					24 Cr	44
11 Na	8 O					23 V	43
10 Ne	7 N					22 Ti	42
9 F	6 C					21 Sc	41
8 O	5 B					20 Ca	40
7 N	4 Be					19 K	39
6 C	3 Li					18 Ar	38
5 B	2 He					17 Cl	37
4 Be	1 H					16 S	36
3 Li						15 P	35
2 He						14 Si	34
1 H						13 Al	33

61 Pm	67 Ho	64 Gd	66 Dy	65 Tb	68 Er	60 Nd
62 Sm	58 Ce	70 Yb	71 Lu	69 Tm	59 Pr	63 Eu

SOURCE READINGS: INTEGRATIVE MATERIALS AND METHODS

The Problem of Mind and Matter

IN his Presidential address to the Royal Society, entitled "The Internal and the External Worlds," reported in *Nature*, December 12, 1959), Sir Cyril Hinshelwood discusses the concomitance of the inner world of conscious experience and the outer world of Nature, and the effect which the flow of discoveries in modern science has had upon this philosophical problem.

In the first place, Sir Cyril believes, a general issue is raised by this problem of mind and matter: the concern of science with philosophy and especially with metaphysics. But what is metaphysics? In the last resort it is the search for a statement subsuming the ultimate nature of all reality. Science has more modest hopes, yet the total neglect of philosophical aspects may lead to an unhealthy indifference to the relationship of science to existence in general. And even though science may seem to decline metaphysical statements, it not only throws out challenges to philosophy but also is frequently itself confronted with problems inescapably philosophical in nature.

In support of this view, Sir Cyril points out that an important criterion for judging scientific theories is the degree of mental and aesthetic satisfaction they afford. The difficulty of complete aloofness from philosophy is also illustrated by parts of physics. The theory of relativity established the observer as an indispensable participant, and according to the Pauli principle, observability, becomes inevitable with the very possibility of existence. Thus the foundations of inanimate Nature can scarcely be discussed without admission that subject and object have in the past been too crudely separated. Even in the field of quantum physics, the professed empiricism is half-hearted. "Waves of probability" are created, electrons become "clouds," potential barriers are "tunnelled through." The discovered facts of Nature are in themselves so mysterious and impressive that they cannot but make impact upon the thoughtful mind.

If this is true of the physical sciences, it is equally so of biology. It is therefore surprising that biological discussions often underestimate human consciousness as a fundamental experimental datum. Yet we cannot validly disregard the data of our own consciousness except by a deliberate abstraction for which we must assume responsibility, and which we should not forget having made.

To those who would take refuge in an entirely mechanical view of human behavior, Sir Cyril

offers the facts that moral qualities are not explained by natural selection, human behavior is not machine-like, and the mind-matter relation cannot be ignored in an intelligent consideration of existence.

The problem of consciousness must start with the fact that the observer has a wide range of conscious experiences. The significance of this can be questioned, first by the objection that so far as any operational test goes other people may be behaving as machines, and secondly, by the assertion that consciousness is a more or less irrelevant concomitant of behavioristic reactions. But the existence of consciousness in other people is probable for the same reason that the existence of the atomic nucleus is probable: it is inferred by reasoning from many complex experiments, so that a coherent body of doctrine emerges. Likewise, human evolution has developed an elaborate and sensitive communication system. Sir Cyril writes: "The hypothesis that other people have an interior life not unlike my own enables me to register correspondences at point after point in so intricate a way that I accept the hypothesis. . . . The content of consciousness must rank as something directly experienced by everyone, and therefore as providing observational data. The communication mechanisms exist, and one of their uses is to enable us elaborately to test the coherence of predictions from the hypothesis that conscious life is on the whole much the same for different people." This inner life is described in poetry and fiction, which serve little biological purpose but nevertheless evoke memories of our own experiences, which check as significantly as those coincidences of calculations and dial readings on which we base our views about the physical world.

To the objection that the conscious experience is supernumerary and irrelevant, since machines can perform actions indistinguishable from those of man, Sir Cyril rejoins that all machines work to a "program"—even the master machine which may program all the rest. However, in its higher functions, the human brain is programmed, not by other mechanisms, but by aesthetic and moral elements which somehow have their seat in the consciousness, by elements which belong to the half of reality concerned with the observer rather than the observed. Of the concomitance of consciousness with brain processes there is no doubt, but concomitance does not mean identity. In a concomitance of A and B it is justifiable to assert that A is the cause of B without admitting the possibility of a reciprocal relation? If we assert that physical happenings in the brain can affect con-

sciousness, we must admit in principle that physical happenings in the brain may be consciously caused.

In parts of biology questions of consciousness cannot be set aside. Behaviorism may describe the actions of individuals in a group, but it ignores the experimental datum that in their conscious minds what men individually think or feel is of far more importance to them than any mechanical part which they may play in the biological community.

There is, of course, a clear enough meaning in the statement that consciousness and moral and aesthetic feelings are developed by evolution and natural selection. But the recognition that something present will be selected gives no clue whatsoever to its actual nature or genesis. For the purposes of natural selection a purely unconscious reaction of the brain and nervous system would have sufficed. Beneficial reactions need have no conscious counterpart, as is widely evident in human physiology. But behavioristic descriptions in general ignore data which, so far from being trivial, are the only things which make us *inter alia* concern ourselves with science at all. If free will, moral feelings and other conscious elements are illustrations, wherein can lie their selective advantage?

Human knowledge will not be in a satisfactory state until the dichotomy of the internal and the external is somehow removed. Even if there is at present no obvious suggestion of what kind of advance can be hoped for in the problem of

psycho-physical concomitance, its consideration at least avoids the errors so easily made both about physics and about biology when the problem is ignored. And history shows clearly that the discoveries of science and the evolution of its grammar go hand in hand.

It would be a mistake for men of science to withdraw from the inquiry, in Sir Cyril's opinion, for in one way, because they start by demanding least of an explanation, they are the most likely to succeed in finding it. The question might be asked: What happens when an atom emits light?" The more naively this is considered the less is an answer possible. But the laws governing various correlations, change of atomic state with quantum emission, or quantum with field have been formulated in terms of concepts appropriate to the problem, and they yield satisfaction.

In the light of this analogy, the further exploration of the concomitance of the internal and external worlds appears less hopeless. The right grammar and language need to be evolved. In the process the present bounds of science may expand. In the meantime those numerous studies are to be welcomed which, without solving the central problem, keep it constantly alive. Above all, there lies hope that sooner or later to the eye of genius some quite ordinary phenomena will reveal, like the fall of Newton's apple, an undreamt of but thenceforth obvious significance.

—E. B. Sellon

NEWS AND NOTES

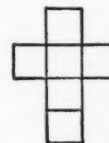
CHEMISTS and physicists deal with many of their most basic problems in poly-dimensional terms. The atom's relation to the electromagnetic field is an instance, and an electric motor at work is a visible test object of such a field which, in itself, is beyond direct, familiar, sensory reach. Hence, such domains cannot be directly measured, and their characteristics must be calculated from the behavior of physical instruments designed to respond to the invisible force field.

Looking upon such a field as a hyperspace, we note that it is not only beyond direct sense experience, but its geometry actually eludes visualization. That is, the eye cannot see the field, and the eye of the mind (imagination) cannot picture examples of its authentic properties. Representations of no-dimensional, of one-, two-, and three-dimen-

sional forms can be looked at and also imagined:



But the analog of a cube in four dimensions is not picturable, in its true state. However, its real properties can be calculated, and then can be studied in three-dimensional models which can serve to show to us the true relationships of the vertices, edges, plane surfaces, and volumetric forms which bound the figure. The procedure is precisely analogous to that by which we can study an ordinary cube in two-dimensional representations on the surface of a sheet of paper. This is the flat representation of the six sides of a cube. It shows them as they are, perfect

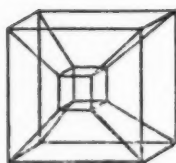
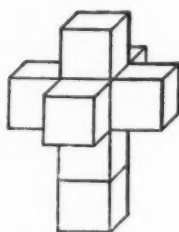


squares. But other properties of the cube have eluded us: The sharing of edges by two squares is seen here only five times; and the most meaningful of a cube's properties, namely, its containment of volume, has vanished entirely. Again we



can represent the cube thus: In this case the relations of the sides sharing an edge, and of three faces sharing a vertex are shown, but at the sacrifice of squareness in four

of all of the faces; and again there is no volume. In precisely the same manner a four-dimensional cube can be represented in three dimensions, with comparable losses. Thus this figure portrays the correct analog for the first one, above. If done in three dimensions (say, in wire) it would show the eight boundary cells all as cubes. But other



properties of the true four-dimensional figure would be misrepresented. As in Figure 1, so here in Figure 3 that which is contained in four dimensions is lost. It may be called duration, if we are thinking of the four-dimensional domain as space-time.

Again we may represent the figure under consideration thus: In this case the eight bounding forms are shown in correct relations to one another as far as the sharing of faces, edges and vertices is concerned, but at the sacrifice of the perfect cubicality of six of

them, and of equality in the two which do appear (in a wire model) as cubes. Again, what is contained, i.e., duration, is necessarily lost. Besides a cube in four dimensions, all other regular convex polyhedra are found by calculation to have analogs therein. In addition, an entirely new regular figure, now called not a polyhedron but a polytope, joins the series.*

In nature the morphology of one whole class of forms, the inorganic crystals, has since 1850 been systematized in a small group of three-dimensional space-lattices computed by Auguste Bravais. Fundamentally, these in turn derive from two of the regular polyhedra, the familiar cube and its reciprocal, the octahedron. That others of the regular polyhedra should function variously in mor-

phology is an expectation naturally resulting from what is now known of the role of space and space-time properties in science.

A new and bold attempt to arrange the periodic table of the chemical elements in such a way as to improve the systematization of chemical and physical properties appears in this issue. The scheme employs the properties of that regular polytope which is an analog of the familiar dodecahedron. That polytope has 600 vertices, 1200 edges, 720 faces, and 120 volumetric boundaries, each a dodecahedron. In four-dimensional Euclidean space this 120-cell-bounded figure has its exact opposite or reciprocal form, with 120 vertices, 720 edges, 1200 plane faces, and 600 bounding volumes. In this case the bounding cells are tetrahedron.

Our author has disposed a chemical element at each of the 120 locations, and proposes that from this disposition and the interrelations permitted in four dimensions, the chemical order of nature can be deduced in a way *not* revealed by any of the present two- or three-dimensional paradigms, which started with Mendeleev.

The proposal is published here, for the first time, and necessarily in extremely compact form. If it turns out to have merit, pages and even many volumes may be written in due time about this proposal. It is the policy of MAIN CURRENTS to afford opportunity for new and daring ideas to be shared, provided such ideas have *prima facie* interest. Readers may find the idea not easy to take in, but they may console themselves with the thought that it may also prove startling to those of their friends who are chemists. We suggest that the Landry article be called to the attention of others.

—F. L. Kunz

During its sixteen years of publication, MAIN CURRENTS has been able to maintain its original subscription price, in spite of the fact that within this period the number of issues was increased from four to five, and an index was added. Twelve years ago the magazine became the official organ of the Foundation for Integrated Education, which gave it increased stability but no increased revenue, since the Foundation is not a funded organization. It is only through the generous support of our publisher, Mr. Julius Stulman, and of Associates of the Foundation and subscribers to MAIN CURRENTS that the journal has been able to continue.

In the face of rising costs of publication, the owners and editors have now reluctantly agreed that a small increase in our rates will be necessary: from \$3.00 to \$3.50 for a year's subscription; from \$5.00 to \$6.00 for two years (foreign proportionately). Since we do not like to make this move without warning our readers, this increase will not take effect until May 30, 1960, and subscriptions and renewals received before that date will be honored at the old rate.

* MAIN CURRENTS, Vol. 8, No. 1, March 1951. Standard works in this field are *Geometry of Four Dimensions*, H. P. Manning, and *Regular Polytopes*, H. S. M. Coxeter. See also *A Primer of Higher Space* and *The Frozen Fountain*, both by Claude Bragdon.

REVIEWS

Society in Transition — the Making of a New Morality

EVENTS which need no review have given fearful urgency to the need for an effective re-centralization of education upon moral and ethical meanings, not as aspirations alone, but as spiritual strength generated by an understanding of nature and of man. These events include the corruption of power in democratic as well as other governments, a fact presented with concentrated force in the first half of *Power and Morality*, by P. A. Sorokin and Walter A. Lunden (Porter Sargent, Boston, 1959 pp. and brief index, \$3.50). To page 116 the book races along with what the reader might take to be sustained fury, so intense is the writing. He may have previous acquaintance with scattered bits of the data here marshalled, but taken together and put as they are here, they might make the reader sick at heart if he read no further than page 116. From here on, however, the authors proceed to examine the deeper cause in the sensate culture which Sorokin in particular has so fully analyzed in major works, and which he has traced out in the article which appears in this and the preceding issue of *MAIN CURRENTS*.

For example, he writes, "Before 1940 neither the Truman nor the Stalin administration, neither Eisenhower nor Khrushchev, neither the supreme commanders, generals, and admirals, nor any of today's leading statesmen and politicians had the fuzziest vision of the atomic, hydrogenic, and outer-space policies which contemporary top rulers are now carrying on. Each of the recent important scientific advances has forced them to fundamentally revise their plans and replace them with new and quite different diplomatic, military, economic, educational and other policies. In this sense, today's ruling statesmen and politicians are increasingly becoming mere figure-head-executors of the silent orders of science and technology."

Only last January Prime Minister Nehru remarked for himself and his government that in India no less than elsewhere, government is "driven to men of science to find out how we can tackle . . . major problems." Since it is notorious that science as we now have it takes little account of moral values and indeed, without philosophical treatment, is short on over-all meanings about human life, it is clear where our troubles arise and where the abatement of them must begin. A most timely book, this.

—F. L. Kunz

Man's Long Pursuit of the Real

THE great philosophical transition now proceeding might well be stated in the form of a choice:

Do we continue to believe that we can be guided only by hopes, aspirations and ideals, because the

universe provides no demonstrable principles for the development of man *as man*? If this is the case, humanity has to be left to its own devices; there are no rules for the game. Then truth becomes a bodiless apparition with little chance for survival among the half-truths which crowd public life and the whole falsehoods which proliferate in the fertile soil of self-interest. And love, no longer the imperishable heartener of man, but only a wished-for dream, finds herself easily supplanted by today's image of desire—a simpering creature of prettiness rather than beauty, sentiment rather than emotion.

Or, as alternative, can we pursue *reality*, in confidence that within the orders of nature there may be found the secrets that lead to human fulfillment? This is the choice that lays obligations upon the chooser: to do something about it through research and study and commitment to a philosophy of life. No doubt that is why so many neglect the issue, for although the new science makes research in the philosophy of nature both possible and necessary, little is being done.

Arthur Koestler's stirring book, *The Sleepwalkers, A History of Man's Changing Vision of the Universe* (Macmillan, New York, 1959, 542 pp, notes, bib., index, \$6.50) underlines the current problem by placing it in historical perspective, since his theme is the vicissitudes undergone by European thought in its pursuit of realistic idealism. He confronts the great intellectual issue of all times—the relation between the mind of man and the orders of nature—an issue which has now developed into a crucial test for government and economic leadership the world over. Koestler acknowledges the stature of the problem by placing it against a tremendous tapestry. Part I of the book discusses Pythagoras, Philolaus, Herakleides, Aristarchos, Plato and Aristotle, with a chronological table; Part II deals with the descent of the darkness and the return of the light: Plotinus to Roger Bacon; Part III, entitled "The Timid Canon," considers Copernicus and company; Part IV is rightly the center of the pageant: Tycho Brahe, Galileo, and of course (and superbly done) Kepler. Here the use of homely details of the lives of the pro- and antagonists pays off richly. The very smells of Weil-der-Stadt in Swabia assail our nostrils. Genius amid squalor is marvelously reconstructed for the reader.

But Part V is a let-down. Galileo's triumph and his struggle with the Church are wonderfully recounted, but even with another good chronological table and an epilogue, the drive to the real conclusion somehow slows, falters and halts. For, as Koestler makes clear enough, the question was, and still is: Is the sense-perceived physical world the only domain that is experiential? He faces this issue on page 536:

"I shall quote two examples which seem to me to illustrate this blindness. The materialist philosophy in which the average modern scientist was reared has retained its dogmatic power over his mind, though matter itself has evaporated; and he reacts to phenomena which do not fit into it much in the same manner as his scholastic forebears reacted to the suggestion that new stars might appear in the immutable

eighth sphere. Thus for the last thirty years, an impressive body of evidence has been assembled under strict laboratory conditions which suggests that the mind might perceive stimuli emanating from persons or objects without the intermediary of the sensory organs; and that in controlled experiments, these phenomena occur with a statistical frequency which invites scientific investigation. Yet academic science reacts to the phenomena of 'extra-sensory perception' much as the Pigeon League reacted to the Medicean Stars; and, it seems to me, for no better reason. If we have to accept that an electron can jump from one orbit into the other without traversing the space between them, why are we bound to reject out of the hand the possibility that a signal of a nature no more puzzling than Schroedinger's electron-waves should be emitted and received without sensory intervention? If modern cosmology has a single comprehensive lesson it is that the basic events in the physical world cannot be represented in three-dimensional space and time. Yet the modern version of scholasticism denies additional dimensions to the mind, or brain, which it readily accords to the particles of a piece of lead."

But Koestler then himself sheers away and puts the blame not on the competent people who should be at work in this area, but on others: "I am not playing on the word 'dimension' as a mechanical analogy—after the manner of the 'fourth dimension' of occult quacks. I am merely saying that since the space-time framework, the concepts of matter and causality as understood both by classical physics and by common-sense experience, have been abandoned by modern physics, there seems to be no justification in refusing to investigate empirical phenomena because they do not fit into that already abandoned philosophy."

Why bother with even a mention of people unequal to the job in hand? The real question is why able folk are not put to work on something so important. So, we are where we started. Koestler really says, "Attend to *all* empirical phenomena." But how does one attend without a bold theoretical re-structuring in terms of hyperspace as reality? Without a program, a method, a philosophy? But let us not blame the author for his failure to press home the argument in today's terms, when the whole scientific enterprise is, indeed, philosophically at dead center. *The Sleepwalkers* may prove to be just the push needed to get it moving. Certainly it is aimed in the right direction, and we are grateful for its vivid writing and concentration upon what is undoubtedly the greatest of all issues.

—Edward W. Hermann

The Method, the Training, The Thinking of Science

IN forty-three small pages, the 1959 Burton Lecture by Lawrence K. Frank on *The School as Agent for Cultural Renewal* (Harvard Univ. Press, Cambridge, 1959, \$1.50) assesses some of the implications of those events in science which have converted presidents, prime ministers and such potentates as still persist, into custodians for scientific committees and economic groups. In this Dr. Frank sees hope, not so much

because of what now goes on in those circles, but because of the potential. He writes: "Science is genuinely humane, focussed on man and his capacity to create imaginatively a coherent and credible concept of nature and human nature by the exercise of creative imagination disciplined by science." And again, "Modern scientific thinking based on postulates formulated by creative imagination has placed man in the center of that conceptual universe, recognizing that the only universe we can hope to know is what the human imagination, disciplined by scientific training, creates by its basic assumptions and rigorous explorations."

The author examined this theme at some length in his *Society as the Patient* (Rutgers Univ. Press, 1948), and of course what has since happened strengthens the argument. In this small volume we have, then, a mature mind bringing his considerable public up to this moment in his thinking about our schools as agents in fact or in potential for this much-needed transition to education for insight. The notes at the end are a record of a considerable number of hopeful developments Frank has observed since the major book appeared.

If the general reader doubts his own ability to seize for himself even the toughest of these ideas that can be converted into the new educational philosophy, let him buy another astonishing small book which puts relativity into 24 figures and 124 pages, with a good index: *Relativity for the Layman*, by James A. Coleman (Macmillan, New York, 1959 reissue, \$3.50). Even Einstein's attempted unified field theory is set forth in this pocket book guide to the cosmos. The author talks down to no one, but he has also no hesitation in affording relief by writing out the Fitzgerald-Lorentz equation in this form:

There was a young fellow named Fisk
In fencing exceedingly brisk;
So fast was his action
The Fitzgerald contraction
Reduced his rapier to a disk

If the reader has any scientifically inclined youngsters at hand, he can give them this book with confidence, for the equation is there also, and besides a delightful drawing showing the basis for it.

—F. L. Kunz

The following books have also recently been received:

Africa, Its People and Their Cultural History, George Peter Murdock, McGraw Hill, \$11.
The United States and Latin America, The American Assembly, Columbia Univ. Press, \$2.
Ethics and the Social Sciences, Leo R. Ward C.F.C., Univ. of Notre Dame Press, \$3.25.
Between Earth and Space, Clyde Orr, Jr., Macmillan.
Strange World of the Moon, V. A. Firsoff, Basic Books, \$6.
The Coming Political Breakthrough, Chester Bowles, Harper, \$3.75.
The Enigma of Survival, Hart, Charles C. Thomas, \$4.50.
History and Philosophy of Science, S. W. H. Hull, Longmans Green, \$5.